Implant-supported telescope restorations in a case involving multiple extractions

The journey is the destination

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Different treatment options exist to restore oral conditions in a way that offers both natural aesthetics and gnathologically optimal function. Important criteria in selecting the most appropriate treatment include a thorough diagnosis of the baseline situation, well-defined treatment objectives, as well as factors related to oral hygiene, diet and personal history. The pros and cons of the various treatment options must be discussed with the patient. This case report is about a patient who was rehabilitated with telescope dentures supported by natural teeth and implants. The telescope design included zirconia primary and electroplated secondary crowns. Both the planning stage and the clinical approach are discussed.

A 32-year-old man presented with a desolate baseline situation at our office in 2006 (Figures 1 and 2). He had not seen a dentist for an extended period. As well as being deeply embarrassed, he had a hard time accepting that treatment was unavoidable. Family and friends had not noticed the dimensions of his condition, as the facial surfaces of his anterior dentition were almost completely intact. The patient had not been able to bring himself to see a dentist before carious lesions were evident on the facial surfaces of the maxillary central incisors.

Diagnosis

A clinical examination revealed that only teeth 12 to 22 and 33 to 44 were worth preserving. The baseline orthopantomogram (Abb. 3) suggested that some teeth could be appropriately managed by conservative treatment, but intraoral probing revealed that they were demineralized and softened by caries. Preserving them by endodontic treatment followed by post-and-core restorations was not an option either. Teeth 17 and 27, despite having been pretreated several years before, were also heavily afflicted by secondary caries. Tooth 35 exhibited a root canal filling, presenting with an apical radiopacity and a club-shaped root.

The reasons for the multiple tooth decay became clear by the patient’s history. Apparently the findings of enamel erosion and carious decay were mainly due to long years of drinking cariogenic beverages. He had been using sugar-containing soft drinks routinely, both as a student and on the job, enabling the related acids to act on the dentition for periods long enough to create this irreversible outcome. Poor oral hygiene was another factor.

Following an initial round of detailed discussions, the patient decided to undergo treatment for implant-supported removable dentures. Key criteria for this decision were good access for
maintenance of these design and the relative simplicity of expanding them as the need arises. Another crucial factor was the cost effectiveness of these free-palate dentures supported by implants. Their telescope design was to include zirconia primary and electroplated secondary crowns (Allfit S-Implantate, Dr. Ihde Dental).

**Surgical approach, materials and methods**

An initial course of comprehensive periodontal and conservative pretreatment was followed by extraction therapy and the provision of immediate temporary restorations. After 4 months of healing, an orthopantomogram was obtained to evaluate the available bone volume. Casts and templates were made, the latter including ball-shaped standardized radiographic markers (Abb. 4).

In the mandible, our decision was to use four cylindrical implants (diameter: 4.1 mm; length: 13 mm) with internal octagon connections (Allfit SSO, Dr. Ihde Dental). The maxillary bone was found to be relatively soft even when the extractions were

1. Patient information about oral hygiene and periodontal surgery; consultation about various options of prosthetic treatment.
2. Impression-taking in the maxilla and mandible; bite registration for the mucosa-supported interim dentures; determination of tooth shades.
3. Periodontal pretreatment measures (professional maintenance, patient motivation, oral hygiene instructions, plaque index, bleeding index, remotivation).
5. Periodontal surgery; maxillary and mandibular tooth extractions over two sessions; insertion of interim restorations.
6. Healing phase and wound control.
7. Patient information repeated; consultation about definitive options of prosthetic restoration.
8. Diagnosis and planning (mounted casts, radiographic template, radiograph).
10. Exposure of implants; replacement of healing caps.
11. Preparation of teeth; impression-taking; bite registration for final restorations.
12. Laboratory fabrication of primary crowns; selection of implant abutments; custom trays; registration aids; travel dentures.
13. Try-in of primary crowns with sealer; overimpression; analysis of jaw relations.
14. Laboratory fabrication of travel dentures, electroplated secondary crowns, tertiary framework, as well as insertion and verification indices; fabrication of custom trays.
15. Intraoral bonding of zirconia primary crowns and of tertiary structure; occlusal assessment and impression-taking; insertion of travel denture.
16. Laboratory fabrication of veneers and wax setup.
17. Try-in of overall restorative restorations; occlusal adjustments.
18. Finishing of the definitive restorations.
19. Delivery of the definitive restorations; instructions for maintenance, oral hygiene and handling.

Figure 3  Orthopantomogram of baseline situation.

Figure 4  Maxillary and mandibular templates with ball-shaped standardized radiographic markers.
performed. We selected 4 conical implants (Allfit STO) with internal octagons in this quadrant, which proved to offer extremely good primary stability precisely inside this soft maxillary bone structure. These implants are made of a fracture-resistant titanium alloy, featuring a compression-style thread with a double-blasted surface, offering the ability to compress even fine trabecular structures in implant beds consisting of cancellous bone. The coarser threads offer an acceptable implant-bone interface in density classes D3 and D4, thereby enhancing primary stability. Handling and storage is facilitated by the fact that the same instruments and abutments can be used with both (conical and cylindrical) implant types.

The surgical procedures were conducted in two separate sessions under local anesthesia. A non-submerged healing protocol was adopted in the mandible. Thanks to the excellent primary stability obtained, the patient was spared an additional surgical procedure to expose the implant heads. This author welcomes the ability offered by the S-implant product line to choose between submerged or non-submerged healing on a case-by-case basis. As expected, the maxillary bone was found to be very soft intraoperatively (bone density D3 to D4 according to Misch and Judy) [1]. Site 15 was managed by sinus floor elevation, using an osteotome technique with spreading and condensation of bone. Only one pilot drilling 2 mm in diameter was performed to the cortical floor of the maxillary sinus. The Schneiderian membrane in the maxillary sinus was elevated after creating a greenstick fracture with convex osteotomes and slight hammer tapping (depending on cortical thickness and bone density) [2]. Once the desired diameter had been reached, the bone pusher was used to condense the augmentation material (Bio-Oss, Geistlich) below the sinus mucosa. The bone can be additionally condensed by the use of convex osteotomes, thus increasing the primary stability obtained during implant placement. The conical SSO design prevents the implant from invading the sinus. In the mandible, the four cylindrical implants were inserted in a separate surgical procedure. A flap was raised to expose the mental nerve for implant placement over the nerve exit point at the mental foramen at site 45. The orthopantomogram illustrates the position of the implant abutments (Figure 5).

**Restorative approach, course of treatment**

Having worn the temporary restorations for 3 months, the patient returned to the office for preparation of the residual dentition and impression-taking in both jaws (Figure 6 und 7). The implant system does not specifically require an open or closed impression technique, but this decision is left up to the technician. Two assessments of the intermaxillary relations were conducted to fabricate the primary crowns and the tertiary framework: a preliminary assessment and a final assessment during try-in. The next session was devoted to connecting the previously selected abutments to the implants in the patient’s mouth, using laboratory-made transfer indices with markings for easy identification.
Figure 6  Occlusal view of maxilla following preparation of teeth and exposure of implants.

Figure 7  Maxillary and mandibular alveolar ridge segments exhibiting considerable undercuts.

Figure 8  The zirconia primary crowns were inserted using a sealer. Excess material was removed.

Figure 9  Verification of all primary crowns with fit checker.

Figure 10  Overimpression of the primary crowns, performed to optimize the fit and reduce the cement gap of the tertiary structure.

Figure 11  Verification of the electroplated secondary crowns with fit checker before bonding.

A try-in of the primary crowns was performed with sealer and fit checker. The final intermaxillary relations were assessed, and an overimpression was taken for precise fabrication of the tertiary framework (Figure 8 to 10). This step differs from the known procedure described by Dr. Paul Weigl (assistant medical director in Frankfurt, Germany) but eliminates the need for any subsequent adjustments to be performed on the tertiary
The next session was devoted to attaching the angulated abutments (using a torque of 35 Ncm) and to closing the screw access openings with a light-curing temporary filling material (Fermit, Ivoclar Vivadent). After rechecking the precision of fit, the zirconia primary crowns were cemented (RelyX Unicem, 3M Espe) (Figures 12 and 13).

After degreasing the primary crowns with alcohol, the tertiary structure fabricated in the framework chairside and reduces the cement gap during bonding of the electroplated secondary crowns (Figure 11).
laboratory was intraorally bonded. A checkbite was performed and an overimpression was taken (Figures 14 to 17).

The laboratory-made travel/interim dentures could be inserted without problems over the zirconia primary crowns. After more sessions for wax try-in and precise occlusal verification, the finished restorations were delivered (Figures 18 and 19). All parties involved were satisfied with the outcome. The patient was comprehensively informed about maintenance, handling and oral hygiene.

Conclusions

As dental restorations are becoming increasingly more complex, there is a need for focused planning and multidisciplinary collaboration. At the same time, restorations offering a high level of aesthetics and longevity need to remain affordable. To avoid losing sight of precision and aesthetics as major requirements, each treatment step must be deliberately planned, continuously reviewed and critically appraised. Minor roundabouts must be accepted on this journey toward our destination.